

6. A train on a particular route is sometimes delayed.
When the train is delayed, the length of the delay is modelled by a normal distribution with

- a mean of 12 minutes
- a standard deviation of 2.5 minutes

If a train is delayed by more than 15 minutes, passengers will receive a refund.

(a) Use the model to find the probability that

(i) a passenger on a delayed train will receive a refund,

(1)

(ii) a passenger who has two delayed trains will receive at least one refund.

(2)

Of the trains that are delayed by more than 15 minutes, 25% are delayed by more than m minutes.

(b) Use the model to work out the proportion of delayed trains on this route that are delayed by more than m minutes.

(2)

Following engineering work, the train company takes a sample of 25 delayed trains on this route and calculates the mean delay.

The company uses this sample mean to test whether the mean delay of the trains on this route has changed from 12 minutes.

Given that the standard deviation of the length of delay is still 2.5 minutes,

(c) find the critical region for this test.

You should use a 1% level of significance and state your hypotheses clearly.

(5)